YEC Cosmology P.W. Dennis

Outline of Topics

- Light Travel Time Problem. My 2018 ICC general relativity solution
 - The issue and ways to solve
 - Uses consistent principles of General Relativity [GR]
 - Eternalism vs. Presentism
 - Exposition of solution
- ASC, Eternalism, one-way speed of light, time travel
 - Theoretical, theological and philosophical ramifications
 - Empirical observation of 1-way speed
 - CalTech experiment
 - One-way Doppler shifts
 - Communicating with the ISS
 - Doppler fading and corrections of high frequency cell phone communications

The "Problem"

- Given that the universe is only 6000 years old, no object further than ~6000 light years would be observable today.
 - Radius of the observed universe is widely considered to be 46 billion light years
 - Minkowskian ("flat" with no gravity, the space-time of Special Relativity [SR])
 universe would seem to imply a universe of tens of billion years old.
 - Calculation using exact GR calculation in expanding cosmos gives ~13.8 Gyrs.
 - Note: GR does not prohibit a global faster than light expansion of matter. Only local speed of light is constant.
- Cornerstones of Solution
 - Biblical Philosophical view of time "presentism"
 - Sound General Relativistic Principles, Methods and Interpretation
 - Rejection of extrapolation of current observations to a distant past singularity.
 - Choice of initial conditions, i.e. spatial 3D space at the moment of creation.

What needs to change?

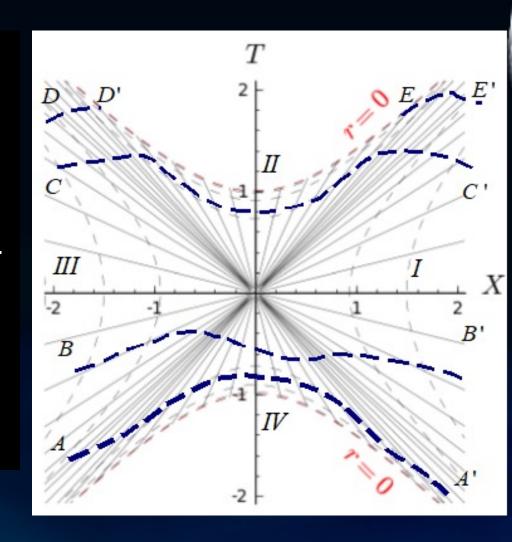
• Since distance "D" traveled by light in time "T" is:

$$D = cT$$

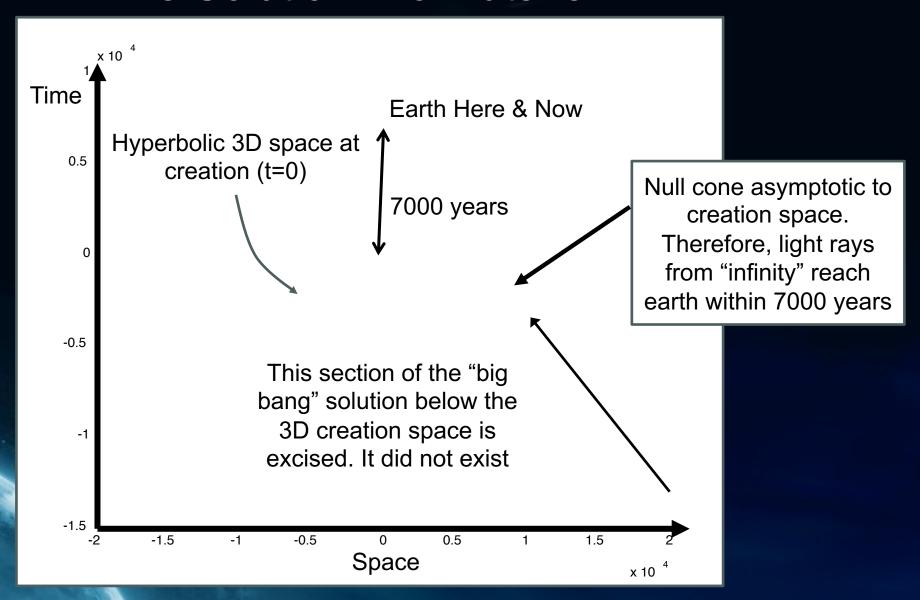
- And since *T* is small, we have two choices:
 - A young and small (in the past) universe
 - Or a big and old universe.
- Changing the speed of light, "c", takes us out of the realm of general relativity.
 My solution is one intentionally based in standard general relativity.

3D spaces and hypersurfaces: Example: Schwarzschild "Black Hole" hypersurfaces

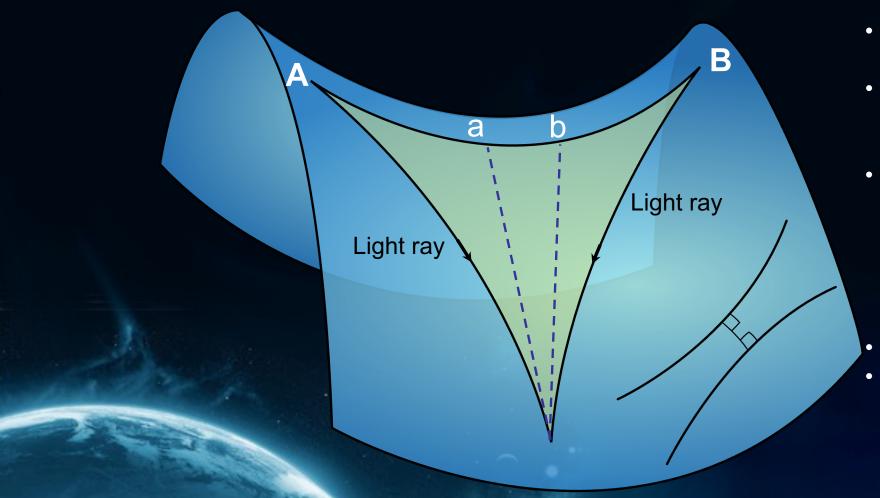
- Surfaces of simultaneity. By relativistic principles any surface could be taken as an actual surface representing the present "now."
- Surfaces temporally ordered: AA' earlier than BB' etc.
- Presentism and Christian theism implies one such spatial hypersurface must be "now" (not by convention).
- Infinite past is inconsistent with Christian theism.
- Infinite past is a mathematical fiction
- There is an initial hypersurface = "the time of creation." For example, BB'. The solution below BB' is to be cut out and discarded. "Cut and Stitch" solution.



The Solution in a Nutshell



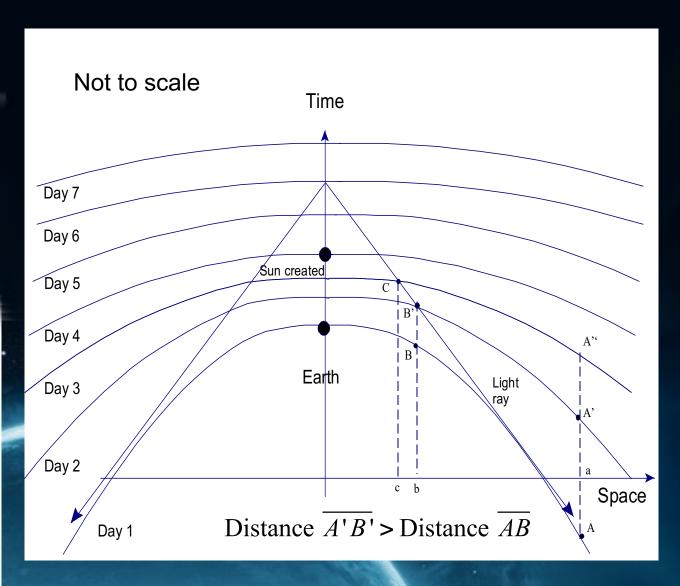
Hyperbolic geometry



- Light Rays converge as they approach
- Essentially gravitational lensing but with a "concave" lens.
- Close objects have smaller angular size than in Euclidean geometry and calculations based on Euclidean geometry predict further distances.
- "AB" is actual size
- "ab" is apparent (angular) size

YEC solution. Initial Conditions

Expansion of Heaven During Creation Week



- This rapid expansion is a version of Faulkner's dasha proposal [*] except it is the matter that "expands rapidly," not the light "shooting in."
- Figure displays a cross section of the "big bang" spacetime [*]. The portion of the "big bang" below the surface labeled "Day 1" did not exist
- Surface labeled "Day 1" is the original miraculous creation and the initial stretching out of the heavens. Only 3D space exists at the creation, There were no past events and future events had not yet occurred.
- On the second day only the 3D space labeled Day 2 existed. Etc. for the rest of history.
- Stars are created close, so light arrives soon
 - * Dasha = "rapid-growth process"
 - ** Important Note: <u>Spacetime does not exist</u> it is just a mathematical abstraction for conceptual use only.

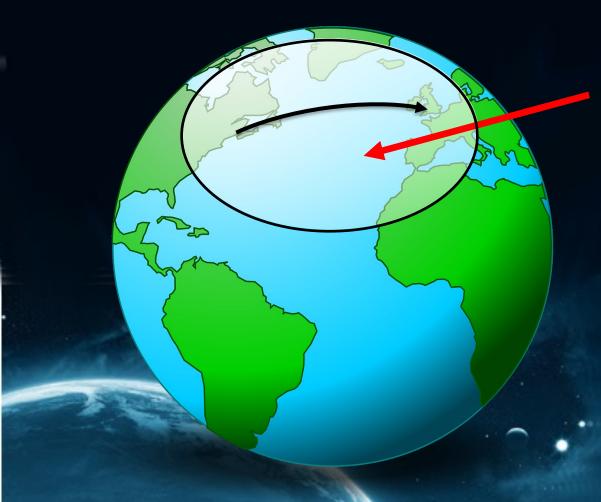
Observational Deductions

Illustration: Geometry of spherical surface



- Example: 2D sphere.
- Geometry of the "cap" is identical to geometry of the sphere and thus shares same geometric properties. *Independent of coordinate charts. Path from NY to London is a great circle path*
- Path is within highlighted "cap." Geometry outside of cap does not affect path from NY to London.

Illustration: Young Age Cosmology is Similar to Piece of Standard Cosmology!



- Example: 2D sphere.
- Geometry of the "cap" is identical to geometry of the sphere and thus shares same geometric properties. Independent of coordinate. Path from NY to London is a great circle path
- In same way, YEC solution is identical to a piece of the standard cosmology.
 Therefore, it has same geometric properties and has same empirical content.

Observational Consequences (1/2)

- Model YEC solution is a piece of the standard "big bang" cosmology.
 - Only difference is the YEC choice of initial conditions and the initial spacelike hypersurface
 - Initial "surface" induces a non-homogeneous 3D space.
 - Since the YEC model is a piece of the standard model it possesses all of the same geometric properties of the "big bang" cosmology within the creation without an ancient past.
 - Consequently, this YEC model reproduces all the observational data of the standard Big Bang model. Except for the merely assumed initial conditions and the presumption of age.
- Age of the universe is not a prediction of any solution of the Einstein Field Equations [EFE]!

Observational Consequences (2/2)

- Do the models reproduce observational data? The answer is trivially Yes!
- Recall GR is a geometric theory of gravity. Observational consequences are computed via geometric invariants, e.g., red shifts.
- From the metric of the solution one can compute all properties of the solution.
- This model explains the astronomical observations without an old universe!

Conclusion

- We have presented a consistent YEC cosmological solution. (Prov. 26:4)
 - Consistent with the normative reading of the Biblical revelation in Genesis
 - Consistent with the mathematics and methodology of relativistic physics
 - Consistent with observational results of the standard cosmological models
 - No ad hoc modeling employed
- Presuppositionally there is no valid old earth objection (Prov. 26:5)
 - The model only differs from conventional solutions in that it uses an initial condition ("creation hypersurface" = 3D space) that supports a young earth.
 - There can be no unprejudiced objection to this solution. A prejudiced objection would rest only upon the assumption of a naturalistic metaphysics requiring a synchronized (simultaneous) explosion of matter from a white hole by extrapolating a current value of the metric backward to a putative initial singularity. Such an assumption is not dictated by GR.

LISLE'S ANISOTROPIC SYNCHRONY CONVENTION (ASC) PHILOSOPHIES OF TIME

Time is not a place!

Genesis of ASC

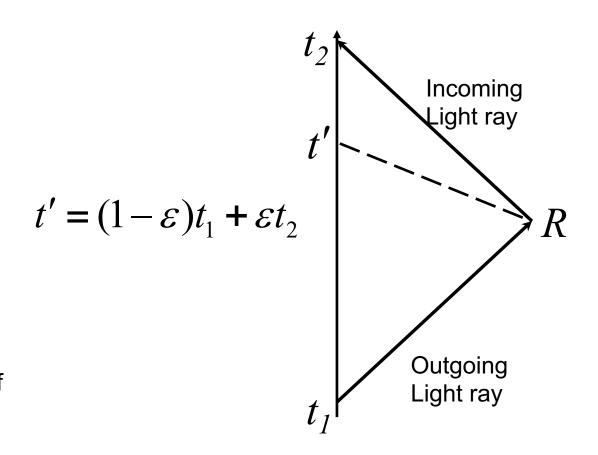
- ASC is identical to Hans Reichenbach's "epsilon" convention for simultaneity.
 - Reichenbach was a logical positivist and held to a conventionalist view of relativity
 - Important to realize that Reichenbach's views were formulated in an era of limited technology. For example, the atomic clock was still just a theoretical concept.
- Due to limited technology the belief was that all measurements of the speed of light that used a single clock were two-way speed of light measurements.
 - A single clock stipulation was needed to bypass the "complications" of clock synchronization.
 - Clock synchronization is a red-herring but still claimed to be a problem.
 - If one adheres to special relativity, then synchronization of moving clocks is not an issue.
 Clocks can be synchronized using time dilation.
- ASC adopts all dated facets of the Reichenbach philosophy of spacetime

One Way Speed of Light a la Reichenbach

- Since we are not able to synchronize a clock at distance R with the single clock at origin, we can assign a conventional "time of reflection" (between t₁ and t₂) at R. (Q: What is R?)
- This means there is no time/event at origin at which the reflection "occurred." The time of reflection is not objective.
- One can see from diagram that in takes less "time" for incoming ray to traverse the distance than the outgoing ray. For

$$t' > \frac{1}{2} \left(t_1 + t_2 \right)$$

- This *illusion* is based on ignoring assumptions of special relativity.
- Bottom line of ASC: "It is impossible to measure the one-way speed of light." This is false!



- Failures of ASC. Fails theologically, mathematically/physically, philosophically, and experimentally.
- Theological/philosophical
 - o ASC presupposes ontological Minkowski space (which is isotropic) then acts as if it isn't. Logical inconsistency.
 - o Isotropy of space is the basis of angular momentum conservation via Noether's theorem.
 - o Theological: Eternalist (evident in Jason's lip service to time travel in "The Physics of Einstein")
 - o Asserts epistemology over ontology.
- Math/physics
 - Pathological "present" (conical singular pathology at origin. 3D spatial "present" is non-Euclidean everywhere.)
 - o Synchronization (epistemology or operational limitations) can't affect age
 - o Coordinates have no necessary physical connection. ASC is a trivial coordinate change for objective Minkowski space.
 - o Changing coordinates cannot change the geometry.
 - o The "speed" of light in ASC is not real, it is not a physical speed. ASC pretends the speed-of-light is nearly infinite.
- Experimental verification of 1 way speed of light has been attained. The 20th century operational/experimental presuppositions have been overturned.
 - Old experiments: 1-way speed of light required two clocks thus synchronization required. One clock could only measure a two-way average. This is the genesis of the synchronization (operational/epistemological), simultaneity (ontology?), one-way speed of light conundrum. Mixing all these issues together in one big ball of string needing to be disentangled.
 - o femtosecond camera employs only one clock, synchronization/simultaneity issues are avoided. Reichenbach epsilon model needs to be buried.
 - One-way Doppler effect
 - Radio communication with the ISS requires correction of TX/RX frequencies
 - 5G/6G mobile phone in high-speed trains (HST).

ASC Theological and Philosophical Ramifications

Assumptions of ASC

- ASC is based on and assumes eternal spacetime, called "Eternalism."
- Simultaneity is a convention, not a reality of the creation. There is no such thing as an objective (ontological) simultaneity in spacetime.
- The spacetime that is assumed is called "Minkowski" spacetime. This has unavoidable mathematical consequences which cannot be contradicted. We will examine this later.



Eternalism in a Nutshell

- "Eternalism" is the philosophy that time is an illusion.
 - Past, present and future events (referred to via tensed verbs) are eternally existing in a universe in which time has been "spatialized."
 - It is a universe in which there is no "now" no unique "present."
 - It is sometimes called a "block" universe in which nothing really happens.
 - Slogan: "Time is a place"
- Was the view of Einstein, Weyl and others, such as the Idealists
- Theories of relativity seemed to support this view
- Minkowski's mathematical formulation of events located in a 4D spacetime lent credence to the spatialization of time

Theological & Philosophical Defects of Eternalism

- Eternalism prima facie makes creatures coeternal with God. As Christians, we thus reject it.
- Since the eternalist "block" universe is a *completed object*, which God has created directly from his hand, then it makes God the author of sin! There are no secondary causes, nothing "happens" after the block universe is created.
- Weyl (1949): "The objective world simply is, it does not happen. Only to the
 gaze of my consciousness, crawling upward along the lifeline of my body,
 does a section of the world come to life as a fleeting image in space which
 continually changes in time." (emphasis added)
- Note the incoherence. Nothing happens in the world yet there are changes.
- Philosophically, to account for temporal experience, the eternalist must replace a single flow of time with myriads of subjective time flows. Hardly a cogent philosophical position.

Theoretical/Logical Defect

- ASC is based on the assumption of Minkowski spacetime.
- As such ASC assumes isotropic physical speed of light.
- One cannot assume isotropic *physical* speed of light as a basic postulate then claim the speed of light is not isotropic. That is an internal contradiction.
- A "little" mathematics. Geometry of "spacetime" starts with isotropic speed of light: Speed = Distance/Time = D/T = c
- Pythagorean Distance, $D = \sqrt{\Delta x^2 + \Delta y^2 + \Delta z^2}$

 $c\Delta T = \sqrt{\Delta x^2 + \Delta y^2 + \Delta z^2}$ $c^2 \Delta T^2 = \Delta x^2 + \Delta y^2 + \Delta z^2$

 $c^2 \Delta T^2 - \Delta x^2 - \Delta y^2 - \Delta z^2 = 0$

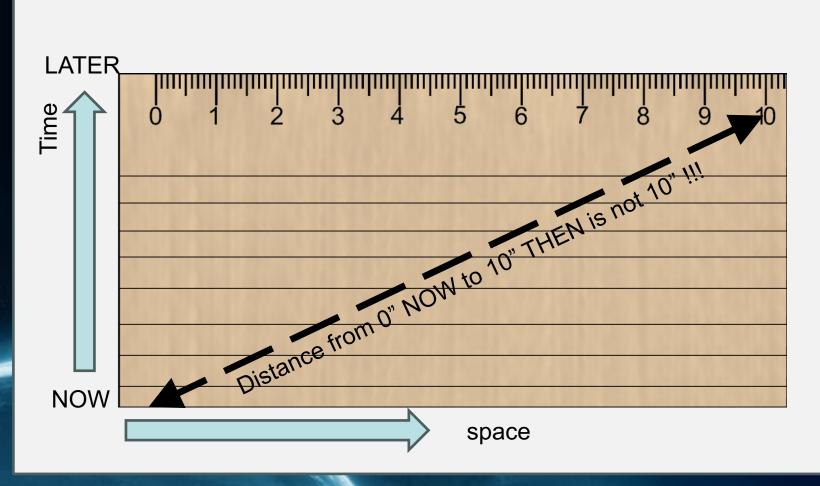
Minkowski Interval ("The Physics of Einstein," Lisle):

$$\Delta S^2 = c^2 \Delta T^2 - \Delta x^2 - \Delta y^2 - \Delta z^2$$

Corollaries of Eternalism

- Time travel is possible. Past, present, and future eternally exist in a timeless eternity. Past is "there" waiting for time travelers to arrive!
- There is no such thing as "now"
- There is no such thing as "simultaneous"
- Distance is not a physical quantity
- One-way speeds are not physical quantities
- Nothing actual happens. Time is an illusion.
- There are no 3D objects persisting through time. There are only eternal 4D spacetime objects. You have no objective shape.

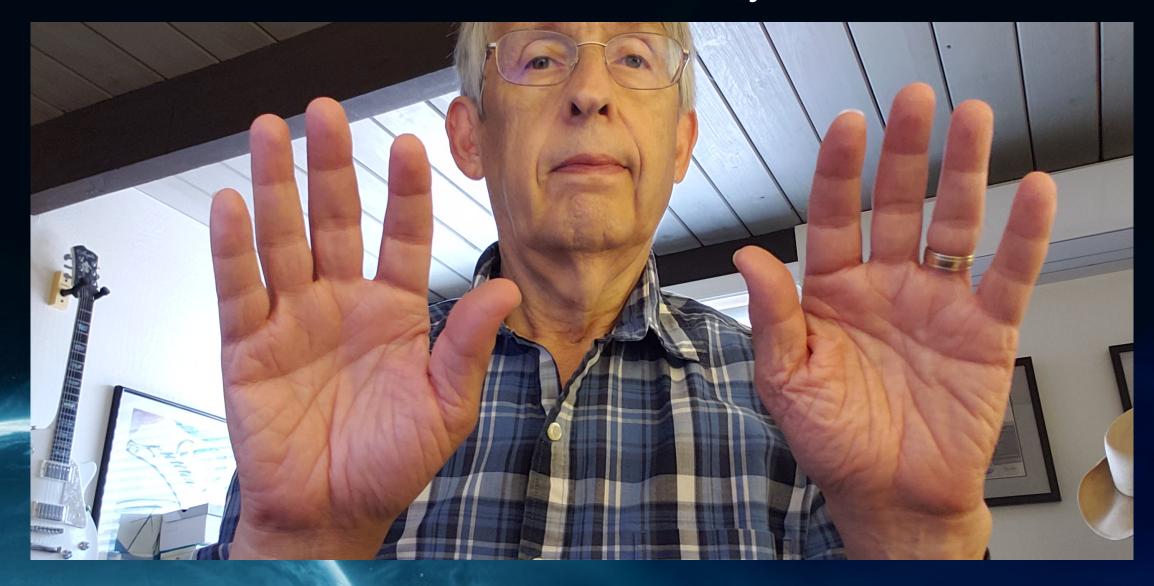
Four Dimensionalism



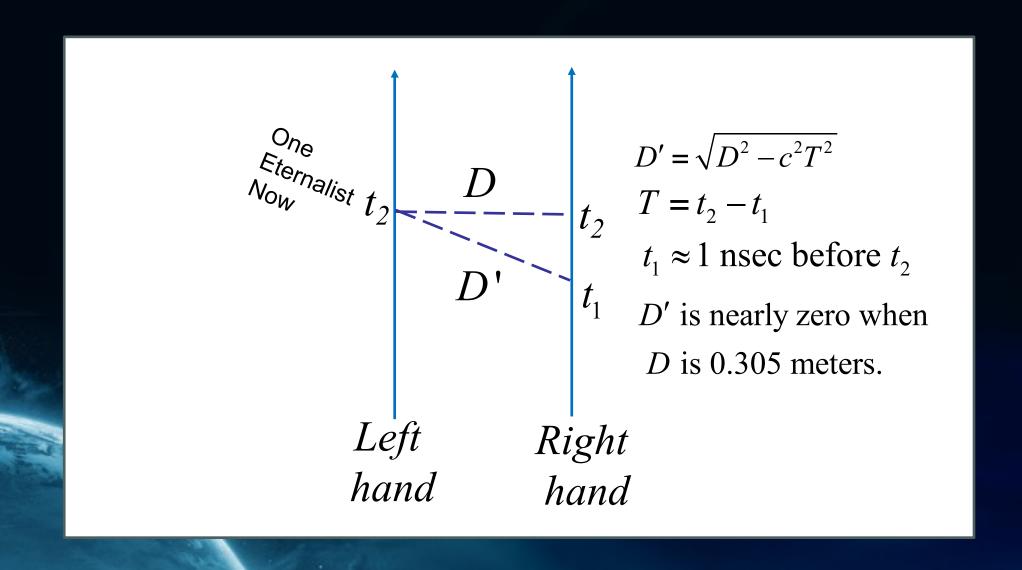
A 2D "spacetime" ruler with "spacetime" area. No objective spatial length since we can't synchronize 10" mark with the 0" mark!

A 1D spatial ruler with length

What is the Distance Between My Hands "Now"?



No "now" and no "distances"



Einstein's Eternalism

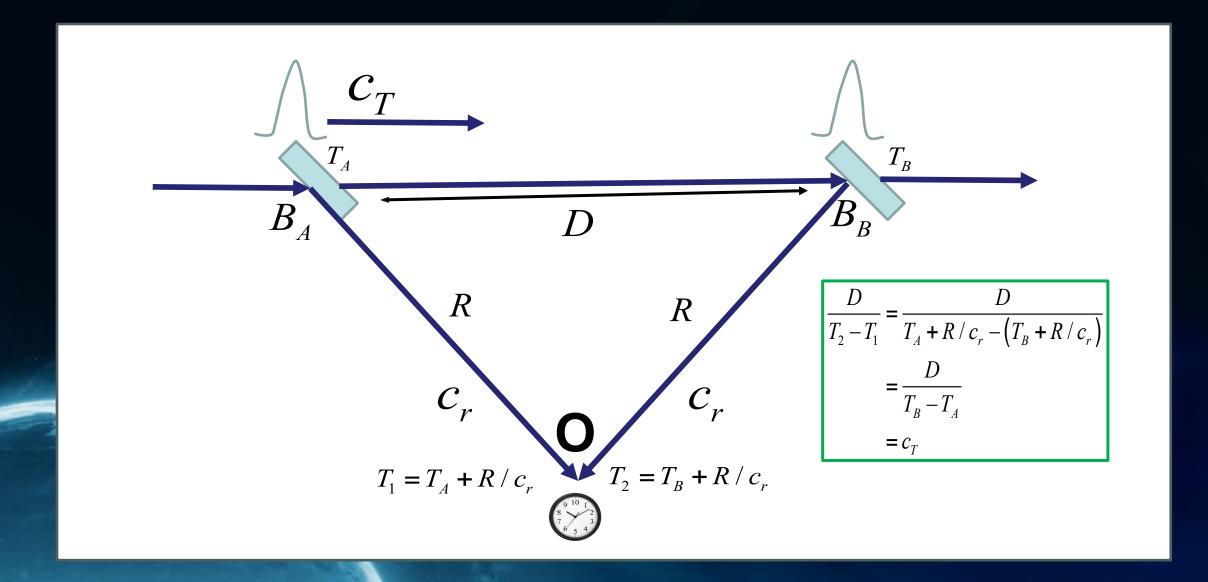
- "The four-dimensional continuum is now no longer resolvable objectively into sections, which contain all simultaneous events; "now" loses for the spatially extended world its objective meaning. It is because of this that space and time must be regarded as a four-dimensional continuum that is objectively unresolvable." A. Einstein.
- "People like us, who believe in physics, know that the distinction between past, present, and future is only a stubbornly persistent illusion." A. Einstein.
- Summary: This a belief in an ontological static (unchanging) spacetime.
 - Past, present and future as a flow of time is not real.
 - There is no "now" of absolutely simultaneous "events". ("spacelike")
 - Past and future is a static geometric relationship between certain events pairs ("timelike")

Presentism

- "Presentism" is the contrary view that the present is real
- The creation is not a Parmenidean block house universe. *Spacetime* is a myth
- There is an actual real moment called "now" throughout the cosmos
- The present continually passes. The past is forever gone, the future will be.
- Contrary to many opinions, presentism is compatible with relativistic physics
 - Eddington and Reichenbach correctly point out relativity is neutral to passage of time.
- Arguments to the contrary are philosophically flawed (as above) or misuse the assumptions and mathematics of relativity
 - Eternalist interpretation is due to endowing an epistemological conclusion (inability to operationally detect simultaneity) with a metaphysical conclusion (time is not real).
 - But the inability to operationally detect simultaneity does not imply time is not real.

Empirical measurement of 1-way speed

Schematic of CalTech Femtosecond Camera



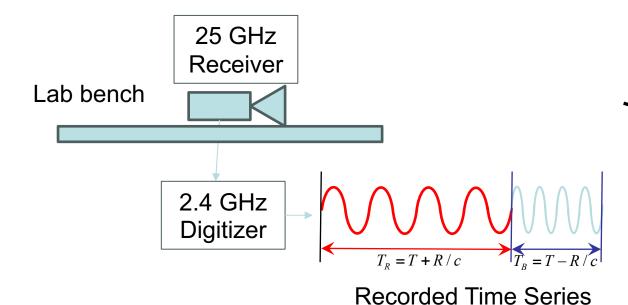
Note:

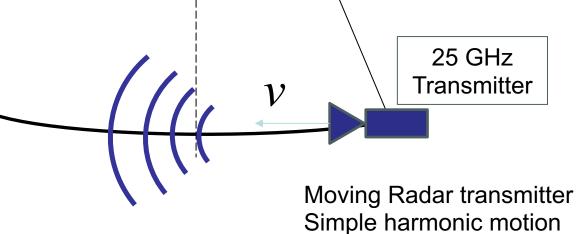
For a 6m pendulum with amplitude 3.3 meters (R = 6.6 m) the detectable time difference is 2*6.6/c = 44 nsec.

Thus a 2.4 Ghz digitizer would see a difference of 106 time samples between the red and blue shift intervals. Easily computing the speed of light "c" toward the receiver.

$$x = A\sin\omega t$$

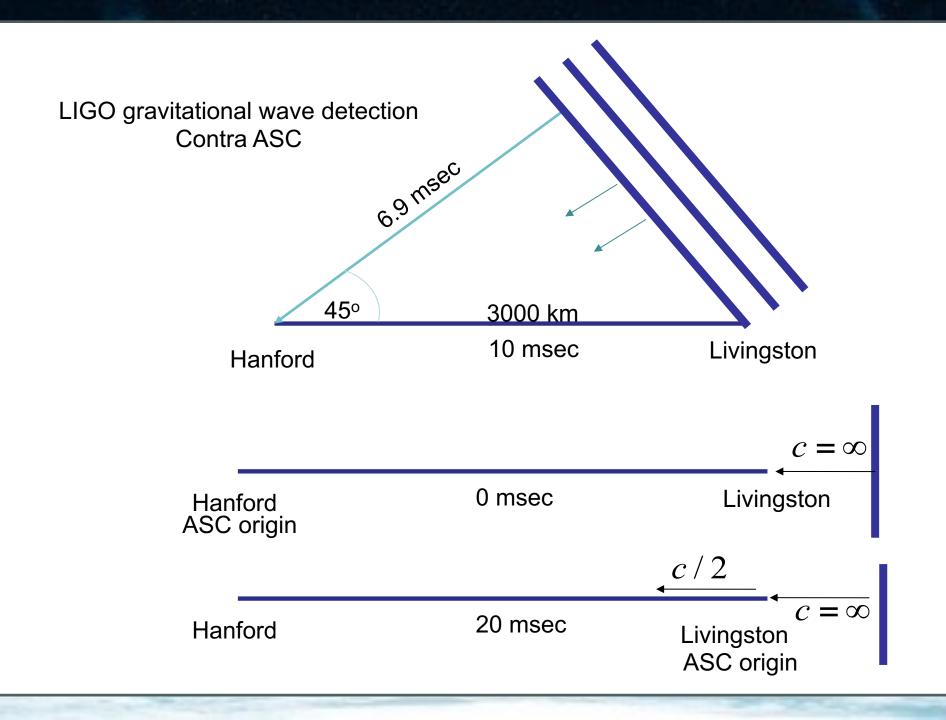
$$v = \omega A \cos \omega t$$





Pendulum



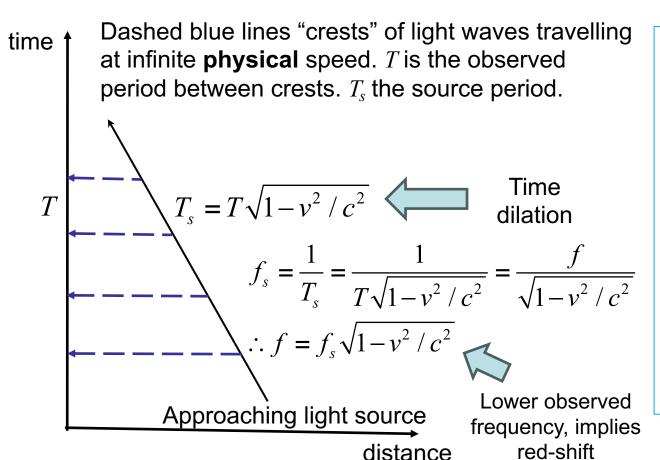




Doppler Shift

- Doppler shift is a change in frequency of a wave due to relative motion of source or receiver
- Doppler shift occurs for sound waves and light waves
- IMPORTANT: It only depends on a one-way trip of the wave
- When distance between source and receiver decreases the frequency increases
- When distance between source and receiver increases the frequency decreases
- Familiar example: Sound of whistles of an approaching train has higher pitch; receding train whistles have lower pitch

Lisle's ASC Violates Doppler Shift



Lisle claims ASC implies we see distant objects in "real time."
Diagram shows that ASC implies we see time dilation in "real time."
Time dilation results in slow clocks, i.e., a red shift.
But approaching light should be blue shifted!

Conclusions:

(1) Lisle's "speed of light" is not infinite. The diagram is incorrect!(2) Lisle's "speed of light" is not a physical speed of light.



Ground Station Must Adjust Frequency to communicate with the ISS ISS velocity

Ham Radio Operator



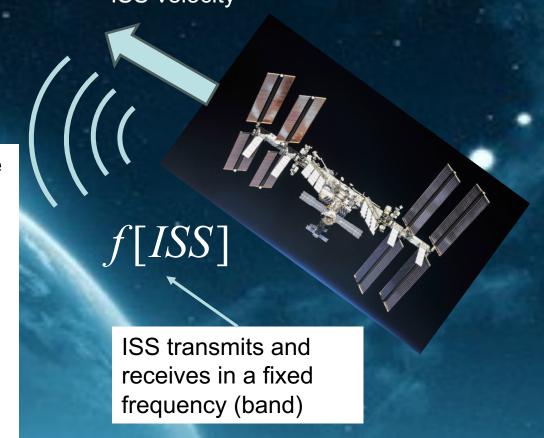
As a result of the Doppler blue shift (increase in frequency) due to the ISS motion:

- (1) the ground station must *lower* the transmit frequency so that received signal at ISS will be within the ISS frequency band;
- (2) the ground station must *increase* the receive frequency so that he can hear the ISS.

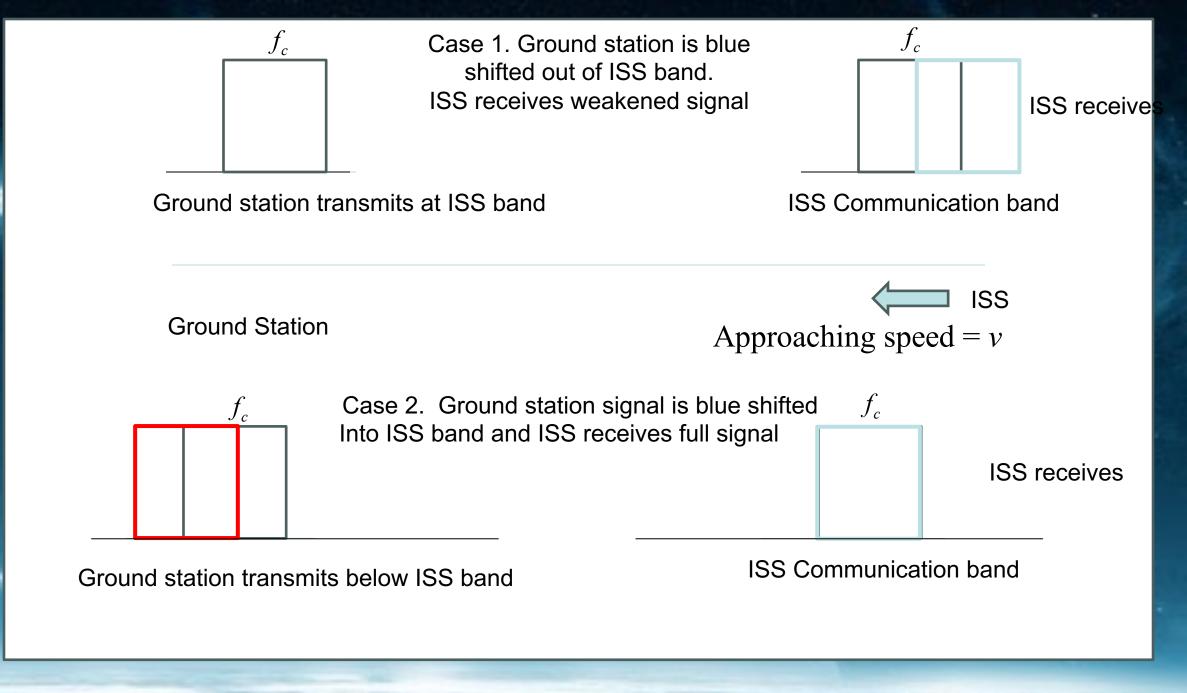
These frequency shifts are **one way** speed of light ("c") effects!

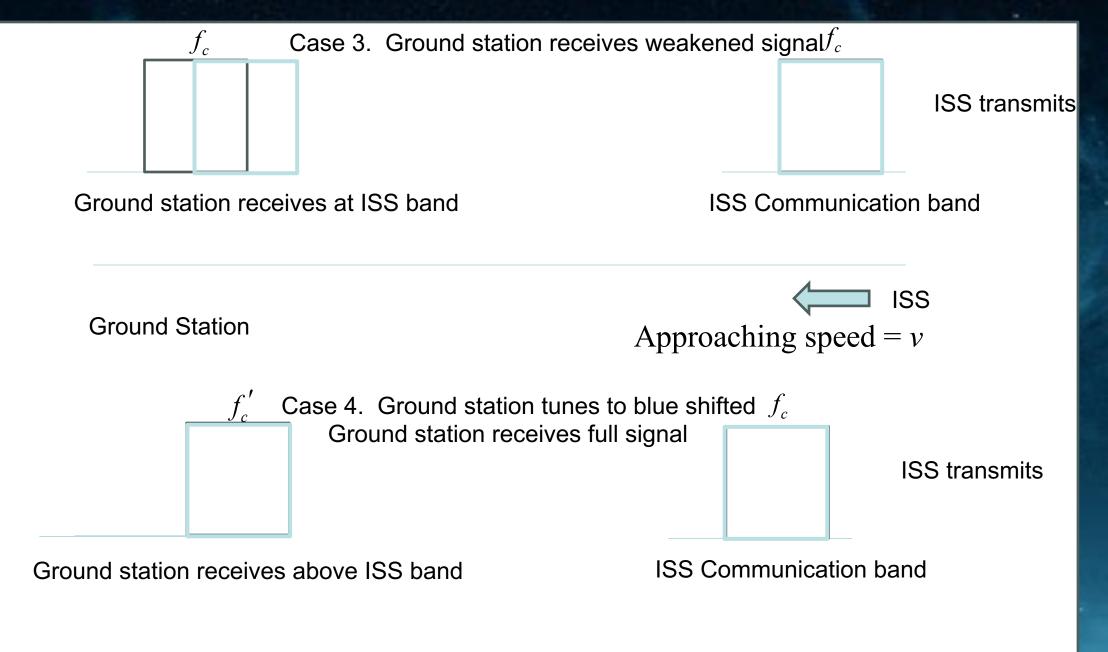
$$\Delta f = \frac{v(ISS)}{c}\cos(\theta)f[ISS]$$

This real-world effect refutes ASC



This link for details: https://www.qsl.net/ah6rh/am-radio/spacecomm/doppler-and-the-iss.html





Doppler fading Corrections of high frequency cell phone communications

Doppler Correction of high frequency mobile cell phone communication

- The Doppler shift in the frequency of one-way cellular communications is an appreciable effect in high-speed trains (HST)
- The Doppler shift needs to be corrected to maintain reliable communications with base stations (BSs).
- The effect will be more pronounced in 5G and 6G phones with high frequency range (FR1 & FR2)
- Details in this online article: "Ensuring fast and reliable 5G service delivery on high-speed trains" url: https://www.ericsson.com/en/blog/2022/7/5g-on-high-speed-trains
- "The main challenges to HST operation in FR1 are securing performance with increased Doppler shift (particularly for mid-band time division duplex (TDD) frequencies), delivering good and consistent coverage, and ensuring seamless handover between BSs along the track."

ASC Transform

$$t' = t - (2\varepsilon - 1)x/c$$
$$x' = x$$

Under the ASC transform

$$OP \mapsto OQ$$

$$S_{OP}^{2} = -c^{2}t^{2} + x^{2}$$

$$= x^{2}$$

$$-(2\varepsilon - 1)x/c$$

$$S_{OQ}^{2} = -c^{2} \left[-\left(2\varepsilon - 1\right)/c \right]^{2} + x^{2}$$

$$= \left[1 - \left(2\varepsilon - 1\right)^{2} \right] x^{2}$$

$$= 4\varepsilon \left(1 - \varepsilon\right) x^{2}$$

$$S_{OQ} = 2\sqrt{\varepsilon (1-\varepsilon)} S_{OP} \neq S_{OP} = x$$

ASC is not an isometry. It does not preserve distances. X is no longer distance. Therefore, under the ASC transform dx / dt is not distance divided by time.

